HPCBS

High Performance Commercial Building Systems

ACM-Change Proposal for 2005 Title 24 Update

Element 4. Low Energy Cooling
Project 2.2 - Efficient Distribution Systems

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Lawrence Berkeley National Laboratory
October, 2002

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Ernest Orlando Lawrence Berkeley National Laboratory

One Cyclotron Road, Berkeley, California 94720

October 31, 2002

Bill Pennington
California Energy Commission
1516 9th Street MS 42
Sacramento, CA 95814

Dear Bill:

As we have discussed in the past, LBNL would like to get the concept of overall HVAC Transport Efficiency introduced into the 2005 standards process. Note that we are not proposing any modifications to the standard, nor to prescriptive or mandatory measures, nor to the modeling algorithms in compliance software. The proposal outlined in the attached document is simply a set of reporting changes, the goal of which is to provide feedback within the compliance process, and thereby within the design process, on the fraction of HVAC energy use that is going into blowing and pumping thermal energy and ventilation air around the proposed building. All of the variables required to calculate the defined HVAC Transport Efficiency are available within the standard reports from DOE-2, and therefore should not precipitate significant efforts on the part of ACM providers.

This proposal represents a first step in the transfer of LBNL's PIER research efforts on thermal energy distribution in large commercial buildings. We expect to provide better tools for evaluating HVAC Transport Efficiency, as well as proposals for how to improve that efficiency, in future standards revision processes.

Thank you in advance for your thoughtful consideration of our proposal, and please do not hesitate to contact me with any feedback or questions.

Sincerely,

Mark Modera
Staff Scientist

Cc: Craig Wray (LBNL), Max Sherman (LBNL)

Proposed Revisions to 2005 Title-24 Energy Efficiency Standards: Addition of HVAC Transport Efficiency Concept

Prepared by:
Mark Modera

NON-RES MANUAL

Section 4.1.2 Basic Mechanical Concepts

A. Definitions of Efficiency

HVAC Transport Efficiency: the ratio between the energy expended to transport heating, cooling and ventilation throughout the building, and the total thermal energy delivered to the various zones in the building. The transport energy includes all distribution-fan, ventilation-fan and pump consumption (excluding DHW pumps), and the thermal energy delivered is the sum of all zone loads. This ratio can be calculated both over the course of the year, and under design conditions.

TE = (distribution fan energy + ventilation fan energy + non-DHW pump energy)/(total thermal load)

ALTERNATIVE CALCULATION METHOD

Should include the following section:

2.4.2.36 HVAC Transport Efficiency

Description: ACMs shall be able calculate the ratio between the energy expended to transport heating, cooling and ventilation throughout the building, and the total thermal energy delivered to the various zones in the building.

Modeling Rules: The transport energy includes all distribution-fan, ventilation-fan and non-DHW pump consumption, and the thermal energy delivered is the sum of all zone loads. This ratio must be calculated both over the course of the year, and under design conditions.

TE = (distribution fan energy + ventilation fan energy + non-DHW pump energy)/(total thermal load)

COMPLIANCE FORMS

MECH-4

Should be modified to report the design HVAC Transport Efficiency at the bottom using the following format:

HVAC Transport Efficiency = (Total Column F + Total Design non-DHW Pumping Power)/ (Total Heating +Total Cooling (from section 2.))

Would also be desirable to report the annual average value of TE, however some additional values would also have to be calculated and reported on the MECH-4 form (e.g. annual pump energy and fan energy, and total annual loads). All of these values should be available from standard DOE-2 reports.